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New reserves strengthen America's Food Front

THROUGHOUT the country, America's "field generals" and their new recruits are busy with a huge campaign of production on the home front. It is their task to raise sufficient food, not only for our fighting men and civilians, but for our Allies as well. This means even harder work and longer hours in the field. But abundant crops prove that our farmers are winning their battle.

And your products are playing a definite and important part in this campaign. Fertilizers—most of them compounded with potash—are a vital weapon in repelling plant disease and drought and in increasing soil fertility.

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...THE...

AMERICAN FERTILIZER

"That man is a benefactor to his race who makes two blades of grass to grow where but one grew before."

Vol. 99 JULY 17, 1943 No. 2

Potash and Superphosphate Supplies and Problems*

By DALE C. KIEFFER

Chief, Fertilizer Materials Unit, War Production Board, Washington, D. C.

I WISH to thank Mr. Brand and The National Fertilizer Association for the privilege of appearing on the program this morning to discuss with you our common problems in respect to phosphates and potash. I should also like to express our appreciation for the splendid assistance provided by your association in developing action programs dealing with the complexities injected into the fertilizer industry by war. Advice from the Washington staff has proved most helpful, and the circulation of current information has been instrumental in keeping industry informed of our plans and proposed action, thereby helping to establish mutual understanding so necessary in times like these.

A year ago last March, when Tom Milliman came to the Chemicals Branch (now the Chemicals Division) of the War Production Board to organize a fertilizer unit, the major problem in the industry was a nitrogen shortage. Our biggest job was the development of a program for the distribution of fertilizer so as to avoid direct rationing, with all of its detail and man-power requirements, and still provide equitable distribution. We know now that rationing was avoided. You know, perhaps better than I, whether we achieved equitable distribution.

Although some far-sighted individuals were pointing to the importance of food in the war effort, the food production program was not yet fully under way and no war food administration had been set up. The responsibility for dealing with fertilizer was then wholly in the hands of the War Production Board. It was recognized that the nitrogen supply would fall short of demand, but we believed that the superphosphate and potash outlook was very good. There was every reason to believe that production of both materials would keep pace with war needs.

When we met here last year, there were mild rumblings of a pending potash shortage. Little did I believe that those rumblings would increase to the intensity of explosions when potash allocations for the 1943–44 year were announced.

Last year our Nation was so intent upon production of fighting equipment, such as airplanes, tanks, guns, etc., that little thought was given to food production. The war is now approaching a stage in which emphasis is being focused upon the job of feeding our Army and civilian populace and the armies and populaces of allied and occupied countries. This problem is so acute and so important to the winning of the peace that the first all-Allied conference to be held during this war was a food conference held here early in June.

In order to conserve nitrogen and to rationalize the industry for war, War Production Board Order M-231 was issued in September of 1942, establishing maximum nitrogen content for fertilizers and a minimum total plant-food content for 33 States. As I recall, California and the other West Coast States were first omitted from the grades list, but finally in one of our bolder moments we established grades for five Western States. This order with its few amendments remained under the jurisdiction of the Chemicals Division of the War Production Board until January 11, 1943, at which time it was decided in the upper strata that the fertilizer problem was

* An address at the Annual Convention of the National Fertilizer Association, Hot Springs, Va., June 22, 1943.

too important to be trusted in the hands of one governmental agency, so that part dealing with mixed fertilizers and distribution to the farmer was transferred to the Food Production Administration.

About the middle of the winter it became clear to us in the War Production Board that the supply of potash was not sufficient to meet the requirements for essential industrial and war uses and to fertilize the crops which farmers were going to be asked to produce by the War Food Administration. It was at that time that we began the initial draft of Order M-291 placing potash under a modified form of allocation. We believed then, and we feel now, that our order was very simple and workable both from the administrative and from the producer's and buyer's standpoints. In reality, the WPB establishes quotas for each potash buyer. There are no restrictions upon the division of purchases between buyers and suppliers. The order passed the fair weather test beautifully. We got by Period One, which was the spot season, beginning in April, 1943, with practically no complaints from either buyers or producers. The modest reductions, which I presume almost every fertilizer man expected, created no problem.

The order now faces some rough weather. There is no doubt in my mind that it will ride the crest, but there is some doubt if the fertilizer industry as a whole is as well satisfied with allocations as in Period One. I have observed some convincing indications that allocations were received with more than mild surprise.

The Superphosphate Outlook

As the War Food Program took shape late in the winter, it became apparent that the demand for normal superphosphate was going to exceed all previous expectations. The superphosphate industry was about to experience a sensation that they had sought for nearly two generations—a demand for their production in excess of the ability to deliver. There is no doubt that in the latter part of the 1942–43 season some mixed fertilizer producers could have sold more superphosphate and that the farmer could have used more to advantage than we were able to deliver. The 1943–44 program envisions a minimum requirement of 6,600,000 tons (basis 18 per cent P_2O_5) of ordinary superphosphate. That is 13 per cent more than this country has ever produced before in any fertilizer year. The 1942–43 year established a record, and we expect to better that record by at least 800,000 tons, basis 18 per cent P_2O_5.

The War Food Administration, as claimant agency for agriculture, has requested that the War Production Board accept the responsibility for supplying this minimum quantity during the coming season. The requirements for superphosphate were presented formally to the War Production Board in a Requirements Committee meeting of the Chemicals Division on June 7, 1943. As an amendment to the 6,600,000 ton figure, it was later proposed that we also attempt to produce up to 9,000,000 tons. Now, it might be a comparatively simple matter to produce 6,600,000 tons or even 2,000,000 tons above that in normal times. However, I doubt if it could be done without some assistance in obtaining sulphuric acid. During wartime, when plants are operating with little better than a skeleton labor force and with the tremendous wartime demand for sulphuric acid, it becomes an extremely difficult job and will most certainly require the cooperation of the Government and of every acidulating plant in the United States.

On May 17 we addressed a letter to superphosphate producers telling them of our plans for 1943–44 and requesting their cooperation in this program. The response to that letter has been most heartening. It has developed that something better than 6,600,000 tons can be produced if approximately 500,000 tons of 50° to 55° sulphuric acid can be supplied to the acidulators. That is over and above the amount of acid which can be produced by the sulphuric plants associated with the acidulating plants and contracts which the acidulating industry can place with outside acid producers. In the opinion of the Acids and Salts Unit of the Chemical Division, the capacity to produce this quantity of acid is available and acid can be supplied provided tank cars are available to transport it and arrangements made to subsidize its movement where the transportation cost would be prohibitive for the manufacturer of superphosphate. All of this requires a program—a program for which the War Production Board is asked to assume responsibility and proceed to develop.

I know that some of you are interested in the outlook for concentrated superphosphate. The situation with respect to this material is very uncertain. Production in the electric furnace plants varies, depending upon military requirements for phosphorus. We are anticipating a total production of about 275,000 tons of concentrated superphosphate during 1943–44. The United States is committed to deliver 152,000 tons to the United Kingdom. All of the United Kingdom requirements,

because of transportation and other difficulties, must come from eastern production, leaving only a small quantity for the fertilizer industry in the eastern part of the United States. This will undoubtedly be delivered almost entirely to fertilizer plants in the Northeast, and is not expected to exceed 1500 tons a month beginning in July.

Up to now our problem in superphosphate has not appeared to be so difficult as to require the services of an industry advisory committee. Now that we are entering upon a definite program for stimulating production of superphosphate to provide the farmer with a sufficient quantity of fertilizer as insurance of the success of the War Food Administration's program, and because whatever action is taken is bound to have its effect upon the industry, it seems that the time has come for the appointment of an advisory committee. The initial steps have been taken to formulate a superphosphate industry advisory committee consisting of ten members representing both large and small producers. It is the intention of those responsible for fertilizer materials in the War Production Board to make use of that committee, and there is no doubt that any recommendations submitted will have a profound influence upon our future course of action.

The Potash Problem

The present potash situation is a vivid contrast to that existing in 1914 when this country was totally dependent upon the German potash monopoly for all potash salts, with scarcely a vestige of an industry of its own. In 1943–44 we anticipate a production of primary potash equivalent to 700,000 tons of K_2O. During the fertilizer year just prior to the start of the war in Europe, total deliveries of potash in North America, Puerto Rico, Hawaii, and Cuba amounted to 412,000 tons of K_2O, 206,724 tons or 50 per cent of which came from domestic plants. When war was declared against France and England this country was looking to foreign sources for one-half of its potash supply. During 1943–44, four years later, this country was called upon to supply North America, Hawaii, Puerto Rico, and Cuba with their entire potash requirements and in addition some for export to the United Kingdom and South America.

The 700,000 tons of K_2O which it is expected will be produced in this country's plants next year will be distributed approximately as follows:

36,000 tons for United Kingdom
35,000 tons for Canada
85,000 tons for industrial and chemical use
4,000 tons for Latin America and other exports
540,000 tons for domestic agriculture, including Hawaii and Puerto Rico.

These figures furnish conclusive evidence that efforts to increase domestic potash production have met with grand success. Our rate of production at the present time is more than twice the rate of production at the begining of the war. However, the demand for potash has increased even faster. I am sorry to burden you with so many figures, but it is the only way I know to clarify the potash problem. In the first place, the fertilizer industry requested 940,000 tons of high-grade muriate. We had 583,000 tons to distribute. The chemical and industrial buyers asked for 133,000 and were allocated 112,000 tons. In addition, we were asked to provide 60,000 tons for export to the United Kingdom and 42,000 tons to Canada. Allocations to Latin American countries will not exceed 4000 tons.

In the case of 50 per cent muriate, the domestic fertilizer producers were treated very well. They asked for only 64,000 tons and received 80,000 tons. The chemical buyers got 340 tons. Canada was allocated 5000 tons of this salt. As to sulphate of potash, the fertilizer industry requested 82,000 tons and got 66,000 tons. The chemical and industrial users asked for 6000 tons and got 6000 tons. Practicaly all of this material is traceable directly to such war uses as smokeless powder, Lend-Lease, etc.

Fertilizer producers requested 108,000 tons of manure salts and were allocated 168,000 tons with 11,200 tons going to Canada.

With a supply so much smaller than requests or requirements, it was necessary that we devise some plan for distribution to the fertilizer industry providing for equal treatment to all producers and, of course, to all their farmer customers. It is realized that there are different ways to provide equal treatment and that the same results will not be obtained with each method. After considering various plans we established a policy of basing potash allocations to individual members of the fertilizer industry upon purchases during 1941–42 and 1942–43; in other words, the 24 months' period beginning in June, 1941 and ending in May, 1943. Potash allocation for delivery during Period Two to each fertilizer plant in the industry is approximately 81 per cent of the average total purchased during those two years, our thought being that 90 per cent of the annual delivery

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Fertilizers for 1943-44

Addresses given by Government officials at the annual convention of The National Fertilizer Association held recently gave assurance that during the next year there will be available to farmers the largest total tonnage of fertilizers ever used in this country. The total tonnage sold during the past year was well over 10 million tons, and there is every indication that the tonnage used during the next year will be in excess of 11 million tons.

There will be much more nitrogen than was ever used before, and considerably more superphosphate, but somewhat less potash than was used this past year. A year ago farmers were faced with a shortage of nitrogen which was met largely by reducing the average nitrogen content of mixed fertilizers. There were some local shortages of phosphoric acid and potash but these were shortages only when measured by demand, for actually more phosphoric acid and potash were used during the past 12 months than were ever used before in any one year.

The principal problem facing fertilizer manufacturers is the fact that the increased nitrogen supply which will come from war plants will be in the form of ammonia and ammonium nitrate. The only way ammonia can be used in fertilizers is to absorb it in superphosphate. The ammonia can be added to the superphosphate and stored for later mixing with other materials to make desired grades, but the preferred practice is to add the ammonia when mixing all the materials, thus saving one factory operation. In order to make the large tonnage of mixed fertilizers that will be needed this fall and next spring it will be necessary for all plants of producers who use ammonia to have ample supplies of superphosphate on hand all the time, for ammonia is shipped in tank cars in liquid form and storage facilities are very limited.

Ammonium nitrate, a large tonnage of which is coming from our own and Canadian war plants, will be used both in mixed fertilizers and for top and side dressing. It is not entirely new to the fertilizer industry, but due to its moisture-absorbing properties its large scale use presents a number of problems. Rapid progress has been made during recent weeks by the producing plants in putting the material into better condition, both for handling in fertilizer plants and on farms, and there are many indications that it can be used satisfactorily. Some of the first shipments from Canadian plants were in poor condition, but these shipments were not originally intended for use in fertilizer. Ammonium nitrate is entirely satisfactory as a source of nitrogen for use on crops.

July Crop Report

The report of U. S. D. A. Crop Reporting Board based on conditions as of July 1st shows that American farmers have planted the largest acreage in 11 years, an increase of about 2 per cent over the 1942 acreage. Total crop production, however, will probably fall about 10 per cent short of 1942, due to the phenomenally good growing season last year. The increased acreage in the war-essential crops will help keep these crops about equal to or above last year's total harvest. Some crops which should show an increase over 1942 are spring wheat, flaxseed, rice, dried beans and peas, potatoes, tobacco and sugar cane. The figures for individual crops are as follows:

TOTAL PRODUCTION (IN THOUSANDS)

Crop	Average 1932–41	1942	Indicated July 1, 1943
Corn, all, bu.	2,349,267	3,175,154	2,706,552
Wheat, all, bu.	738,412	981,327	790,823
Winter, bu.	550,181	703,253	519,190
All spring, bu.	188,231	278,074	271,633
Durum, bu.	26,992	44,660	32,549
Other spring, bu.	161,240	233,414	239,084
Oats, bu.	1,018,783	1,358,730	1,242,255
Barley, bu.	243,373	426,150	353,982
Rye, bu.	38,589	57,341	33,562
Flaxseed, bu.	14,226	40,660	53,008
Rice, bu.	47,334	66,363	71,838
Hay, all tame, ton	73,277	92,245	88,483
Hay, wild, ton	9,675	13,083	11,304
Hay, clover and timothy,[1] ton	23,476	28,276	28,239
Hay, alfalfa, ton.	26,709	36,547	32,635
Beans, dry edible, 100-lb., bag	14,325	19,608	22,021
Peas, dry field, bag	2,617	7,160	9,689
Potatoes, bu.	363,332	371,150	434,942
Sweet potatoes, bu.	69,291	65,380	82,987
Tobacco, lb.	1,349,896	1,412,437	1,396,610
Sugarcane for sugar and seed, ton	5,105	6,044	7,049
Sugar beets, ton	9,834	11,681	7,378
Hops, pound	[2]37,992	34,896	36,820
Peaches, total crop, bu.	[2]55,392	[2]66,380	43,042
Pears, total crop, bu.	[2]27,938	[2]30,717	23,130
Grapes,[3] ton	[2]2,354	2,402	2,622
Pasture	.....	.....	.....
Peanuts	.....	.....	.....

[1] Excludes sweetclover and lespedeza.

[2] Includes some quantities not harvested.

[3] Production includes all grapes for fresh fruit, juice, wine, and raisins.

Nitrogen Supplies and Their Allocation*

By EDMUND ROWLAND

Chief, Nitrogen Unit, War Production Board, Washington, D. C.

I CONSIDER it a privilege to have the opportunity to address this body and to discuss with you the plan of allocation which has been worked out to give you the greatest possible quantity of nitrogen in the face of certain unavoidable difficulties.

Your splendid cooperation in working with the Nitrogen Unit has been an inspiration to us to do everything in our power to overcome the complications involved. You have helped us with your ideas, your ability to adapt yourselves, and your determination to work with us and with each other.

We are faced with a new problem this year which we feel confident that, together, we can work out and work out well. Because shipping space is scarce and ammunition is plentiful, we are going to have material available which is new to many of you in the fertilizer industry. We think that since you are an alert and resourceful group you will adjust your customary practices to meet the emergency.

As a result of decrease in expected ordnance requirements and an increase in ordnance supply of anhydrous ammonia, the picture of nitrogen supply for 1943–44 has changed sharply from that which prevailed in the 1942–43 fertilizer year which ends this month. In broad outline, the changes are:

1. An increase in the supply of ammonia and ammonium nitrate from synthetic sources;
2. A probable decrease in nitrate of soda to conserve shipping.

In order to handle the available materials to the best advantage, it must be realized that neither ammonia nor ammonium nitrate can be stored in any quantity at the points of production. To keep the plants operating at maximum capacity it is necessary for their products to flow evenly into use. It is with this in mind that our system of base allocations for the year 1943–44 has been devised. The commodities included were solutions, grained ammonium nitrate and ammonium sulphate for mixing, and grained ammonium nitrate for direct application.

For those manufacturers equipped to use them, solutions should be the nitrogen material used to the greatest possible extent in mixed goods. For the dry mixer, solid ammonium nitrate must take the place of solutions. In no case should ammonium sulphate be used as the primary source of nitrogen; it should only be used to attain the desired analysis after the maximum amount of solution or grained ammonium nitrate has been used.

Please bear in mind that this entire program is built around our effort to get to you *the greatest quantity of nitrogen.* We are determined that the material shall be conditioned so that it may be used satisfactorily in your fertilizers. We know you will make the best of it and, frankly, it may easily be possible that you will gain in the end from this experience which may now seem so perplexing and difficult.

Shipments of solutions and ammonium nitrate for mixing must be made evenly throughout the year to the various fertilizer plants and a firm order for each shipment must be in the suppliers' hands by the 5th of the month preceding the month of shipment. (This, of course, is not possible for the month of June.) If the supplier does not have such an order, he may assume the shipment has been abandoned by the fertilizer manufacturer and offer such shipments, together with any excess production available that month, to any customer in his territory who has an allocation and wishes to take delivery of the material in advance of his regular shipping date. Orders so obtained will be submitted on a supplemental list to the Nitrogen Unit for approval by the 25th of the month. It is obvious from this provision that the buyer who obtains nitrogen from the supplemental list will receive more nitrogen over the year than the buyer who merely takes his base allocations, and far more than the buyer who abandons some of his allocations.

If, due to the changed military situation, cuts in the allocations become necessary they will not be retroactive on shipped material, and if additional allocations are possible, the

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*An address at the Annual Convention of the National Fertilizer Association, Hot Springs, Va., June 22, 1943.

Problems In Formulating Fertilizers For 1943–44

By F. W. PARKER and W. H. ROSS

Division of Soil and Fertilizer Investigations, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Dept. of Agriculture, Washington, D. C.

(Continued from the July 3rd issue)

Suggestions on the Use of Ammonium Nitrate

Numerous experiments which have included most of the important grades of mixed fertilizers have been conducted on the absorption of moisture by mixed fertilizers formulated with various combinations of nitrogen and potash materials. In view of the resultant data and trade experience the following suggestions are offered relative to the use of ammonium nitrate in fertilizers. They are applicable to fertilizers containing 16 to 25 per cent total plant food, 2 to 6 per cent nitrogen, and 4 to 10 per cent potash.

1. The fertilizer formula should include 20–25 pounds of an active basic material per 1000 pounds of superphosphate in order to neutralize the superphosphate. Hydrated lime, powdered cyanamid or neutralizing ammonia are good materials for this purpose. Dolomite is not very reactive and should be based with the superphosphate if used as the sole neutralizing agent.

2. In complete fertilizers formulated with superphosphate, ammonium sulphate and high-grade potash salts, use up to two units of nitrogen from ammonium nitrate. The ammonium nitrate can be derived from nitrogen solutions, solid ammonium nitrate, or a combination of these sources. If Nitrogen Solution 2A or 3 is used, it may be supplemented with about one unit of nitrogen from granular ammonium nitrate. On the other hand, if Nitrogen Solution 4 is used at the recommended rates of ammoniation, little if any additional ammonium nitrate can be used under average conditions.

3. In complete fertilizers formulated with superphosphate, Urea-Ammonia Liquor-B, ammonium sulphate, and high-grade potash salts, use up to one unit of nitrogen from granular ammonium nitrate.

4. If the fertilizer contains a substantial quantity of manure salts, the combined quantity of ammonium nitrate and urea from solutions or solids should not exceed 60 to 80 pounds per ton. As far as possible, manure salts should be used in alkaline (P-K) grades and low nitrogen-low potash mixtures.

5. Fertilizers containing ammonium nitrate and other hygroscopic materials should be formulated with as low a moisture content as possible. Avoid the use of wet dolomite, fillers, and conditioning agents.

6. If the fertilizer is shipped in moisture-proof bags the indicated quantities of ammonium nitrate could be increased.

7. Ammonium nitrate can be based with superphosphate to make a 4 per cent nitrogen base. If desired, ammonium sulphate may be included to make a 6 per cent nitrogen base. Superphosphate should be well neutralized, as previously indicated.

8. Modify the foregoing rules in accordance with local conditions of temperature, humidity, conditions of storage and trade requirements. Moisture absorption difficulties are greater in the warm weather of summer and early fall than in the winter and spring seasons. Likewise, such difficulties are greater along the South Atlantic and Gulf Coasts than in the Northeast. On the other hand, trade requirements for first-class physical properties are more exacting in the Midwest and Northeast than in the South. All such factors must be carefully considered in formulating fertilizers with ammonium nitrate and other hygroscopic materials.

Discussion

The discussion following Dr. Parker's address was led by M. H. Lockwood, Eastern States Farmers' Exchange, Springfield, Mass., and Dr. Arthur M. Smith, Synthetic Nitrogen Products Corp., New York, N. Y.

Mr. Lockwood: The food production program of our Nation and the important place in food production of fertilizers make it imperative that we face the reality of a suddenly enlarged supply of ammonium nitrate in the form of a solid for use as fertilizer.

Dr. Parker and his associates, together with the producers of ammonium nitrate, are

working diligently and effectively on the improvement of the physical condition of this material which to some of us is new. I can state from experience covering a period of some years in cooperation between my own organization and Drs. Ross and Parker that they have repeatedly assisted in solving problems of this type and have done so with dispatch and marked ability.

Some of us in this industry have used ammonium nitrate in liquid carriers and as Cal-Nitro for years. My own organization's experience in using Cal-Nitro in mixtures goes back more than ten years. Since 1935 we have used both Cal-Nitro and the liquid nitrogen carriers in mixtures except as the war removed our supplies of these materials. We have found that we can use in mixtures, most of which contain 6 to 8 units of nitrogen, 40 to 60 per cent of that nitrogen in the form of ammonium nitrate from nitrogen solution and Cal-Nitro, and secure good drilling properties in the resulting mixtures. During the more humid months of May to September the mixtures containing 60 per cent of their nitrogen as ammonium nitrate become slightly sticky when exposed to the atmosphere. We have therefor generally set a maximum of 50 per cent in recent years.

The following suggestions are offered for handling solid ammonium nitrate at mixing plants:

1. Use it currently, avoiding long periods of storage.

2. For such plant storage as is necessary, use isolated or fireproof "nitrate" storage facilities. Do not store in the general plant.

3. When milling and/or mixing ammonium nitrate, brush the screens and dust the screens with some dry material such as lime at the close of each day. (Mr. Weller Noble, of Califonia, who offered this suggestion, also suggests that similarly cleaning and treating farm machinery with which ammonium nitrate or mixtures containing it are applied is likewise to be recommended.) This practice prevents clogging and retards corrosion.

4. Last, but not least, burn ammonium nitrate bags regularly, preferably at least once each day, in a well-isolated incinerator.

May I close by repeating that problems involved in using ammonium nitrate are not new, and leave with you the thought that with us in the industry lies the responsibility of assuring the use of the new supplies of this material which are available. The will to tackle this is ours to exercise. I feel sure that we will not fail in translating the desire to do it into action in both our own plants and those of our industry associates.

Dr. Smith: It was in the 1924–25 season that appreciable quantities of ammonium nitrate were first used in mixing complete fertilizer. The material, ammonium sulphate-nitrate (26 per cent N), was made by mixing solutions of ammonium nitrate and ammonium sulphate, evaporating and crystallizing. Most of the tonnage was used by a few large manufacturers who solved the problem to their own satisfaction. The necessity of thoroughly neutralizing the superphosphate was not as well understood then as now, but because the formulas contained on the average less total nitrogen and relatively higher proportion of organic materials, the results were satisfactory.

Within a few years anhydrous ammonia, aqua ammonia (B liquior), solutions of ammonium nitrate in aqua ammonia, and urea-ammonia solutions were introduced.

In May, 1929, Synthetic Nitrogen Products Corporation conducted a series of mixing experiments in the factory of Mutual Fertilizer Company, Savannah, Ga. Several hundred mixtures were made to determine the mixing properties of urea, ammonium sulphate-nitrate, and Cal-Nitro, a pellet form combination of finely crystalline ammonium nitrate and pulverized dolomite. Various proportions and procedures were tried in mixing the most popular analyses of complete fertilizers and top-dressers. One result was the clear indication of the basic principle that neutralizing the superphosphate with some active form of ammonia, sodium, or calcium was essential to the successful use of either urea or ammonium nitrate in mixing complete fertilizers.

Based on these experiments, directions were written for using urea and later for the ammonium nitrate containing Cal-Nitro, and a satisfactory volume of sales and usage developed.

For some years prior to 1940, from 60,000 to 65,000 tons of Cal-Nitro (20½ per cent N), containing from 36,000 to 39,000 tons ammonium nitrate, were used each year in fertilizer mixing; the demand for this material usually exceeding the supply. The methods by which urea-ammonia solutions and ammonium nitrate solutions have been used successfully during the past ten years are well known to most fertilizer manufacturers and mixers.

We are now faced with a national need for fertilizer nitrogen that can be met only by

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Principal Articles in This Issue

Use Fertilizer to Relieve Feed Shortage

The greatly increased production of livestock has created a shortage of feed which threatens the whole war food production program. The only way to solve this problem is to grow more total feed, and the most practical thing to do right now is to use fertilizer on hay and pasture crops, including the small grain crops which are to be seeded this fall, in many cases to be pastured during the fall, winter, and spring months.

Estimates made by The National Fertilizer Association, based on interviews with thousands of farmers and on study of experimental results, indicate that on the average a ton of fertilizer used on pasture produces increased grazing equivalent to 8000 pounds of milk or 1000 pounds of beef. A recent study by the United States Department of Agriculture of 26 State pasture experiments shows that the Association's estimates are conservative and that as an average of the experiments studied, a ton of complete fertilizer produced increased grazing equal to 11,500 pounds of milk, or 1400 pounds of beef. Another study of 44 hay experiments indicates that a ton of fertilizer used on hay produced increased yields equivalent to 6400 of milk or 770 pounds of beef.

Thousands of dairy and livestock farmers who have not used fertilizer on pasture and hay crops in the past will find it exceedingly profitable to do so, thus solving the feed shortage problem at the same time.

A good beginning in the use of fertilizers on hay and pasture crops has already been made. For example, it is estimated that about 11 million acres of hay and pasture land were fertilized in 1942, as compared to only 4 million acres in 1938. But up to now most of the fertilizer used on the hay and pasture crops has been superphosphate, or superphosphate and potash, and of course a very large acreage has been limed. Up-to-date only a relatively small amount of nitrogen has been used on hay and pasture. Certainly it will pay to use more nitrogen on these crops, but agronomists rather generally agree that nitrogen alone cannot be used efficiently on soils that are too low in phosphoric acid and potash, or that are too acid. The millions of acres of hay and pasture land that have recently been limed and fertilized with superphosphate or phosphate-potash fertilizers will now respond profitably to the use of nitrogen alone, as will also other land that is in a good state of fertility.

Linson Now Partner in Bradley and Baker

Bradley and Baker, brokers and importers of fertilizer materials, have announced that Edward V. Linson has been admitted to partnership in the firm, effective as of January, 1943. Mr. Linson has been connected with the firm for the past 15 years. No change in the firm name or in the operation of the business is contemplated.

Texas Gulf Sulphur Receives Added Production Award

The Texas Gulf Sulphur Company has been awarded a White Star to add to the Army-Navy "E" Production Award Flag it received on November 2, 1942. Announcement of this second award was made on June 26th by Under Secretary of War Robert P. Patterson in a letter addressed to the men and women of the Newgulf plant and the Galveston loading plant of the Company. The award was made for meritorious services on the production front. It indicates that during the period since the receipt of the "E" Award high standards have been maintained in the quality and quantity of production of sulphur.

Obituary

Morgan H. Grace

Morgan H. Grace, president and director of the Phosphate Export Association, died at the age of 62 at his home in Great Neck, Long Island, on July 2nd. Mr. Grace was born in New Zealand, the son of Sir Morgan S. Grace and Lady Grace, and a nephew of the late William R. Grace, former mayor of New York. He was educated at St. Patrick's College, Wellington, New Zealand, and at Columbia University, and on leaving college entered the employ of W. R. Grace & Company. During the first World War he served in the United States Army Air Corps, attaining the rank of Major, and became president of the Phosphate Export Association in 1919. He leaves a widow, Mrs. Ruth Eden Grace, and five sons: Morgan H., Jr.; John E.; Oliver H.; Lieutenant David R., U. S. N., and Robert N., U. S. N. R.

Fertilizer Distribution for 1943-44 Season

A CHEMICAL fertilizer distribution program designed to make this important farm production supply item available to farmers in such a way as to give maximum assistance in the production of needed food and feed crops is provided in revised Food Production Order No. 5, issued on July 6th by the War Food Administration.

The new order controls the distribution of chemical fertilizer for the 1943–44 crop season.

WFA officials, commenting on the issuance of the revised order, said that the supply outlook for chemical fertilizers during the year ahead is considerably improved. On the basis of preliminary reports, it is estimated that U. S. farmers used about 10 million tons of chemical fertilizers during the 12 months beginning July 1, 1942. It is expected that, in total tonnage, from 5 to 10 per cent more chemical fertilizer will be available in the year ahead. Although nitrogen and phosphates will be in greater supply, potash is expected to be available in somewhat lesser quantities.

While the supply situation is improved, officials said the distribution program has been drafted in view of the greatly increased demand for chemical fertilizer. Consequently, the provisions of the order are shaped to obtain the most efficient use of chemical fertilizer in food production during the year ahead.

The revised order follows the general lines of the original order, with some exceptions made in view of the improved supply situation. The order:

(1) Continues the approved grade program, providing for grades of fertilizer satisfactory for crop and soil needs of the principal fertilizer-using states and yet meeting the need for conservation. The list of approved grades has been worked out with the approval of state agronomists and other agricultural authorities. Each state list is designed to make the best use of available materials, with a minimum quantity of filler to conserve labor in fertilizer plants, save on bagging materials, and to reduce transportation loads.

(2) Again gives priority on the delivery of fertilizer to a list of Group A crops. The A list now includes peanuts, sugar beets for seed production, hemp, dry and snap beans, lima beans, cabbage, carrots, onions, green peas, dry edible peas, potatoes (including sweet

potatoes), sweet corn for processing, tomatoes, and vegetable seeds. Other crops are classified in a Group B list.

(3) Makes the fertilizer available according to a farmer's crop requirements. On A crops this means that a farmer may use fertilizer at any rate of application but not in excess of recommendations of state agricultural experiment stations. Requirement provisions have been opened up for growers of B crops by elimination of the provision which required growers of such crops to have a history on the use of fertilizer to be eligible for fertilizer. This change will permit the use of fertilizer by farmers who have not previously used fertilizers on B crops. The application rate on B crops will be the usual rate for the area, but not above the rate recommended by the state experiment station.

In any case, however, the authorized rate of application per acre takes into consideration the total pounds of plant food in the fertilizer, rather than the total tonnage. For example, if on a B crop the usual rate of application of a fertilizer containing 16 units of plant food per 100 pounds was 500 pounds per acre and a fertilizer containing 20 units is purchased, the farmer would be required to reduce his rate of application to 400 pounds per acre.

(4) Continues the provision under which farmers are required to make application to their local dealers for the purchases of fertilizer according to their crop requirements. In addition to application for fertilizers they will use this fall, farmers under this plan may also apply for fertilizer they will need for use next spring. Manufacturers, dealers and agents are required to make deliveries of fertilizer for A crops before such deliveries are made for B crops. However, in order to insure preference for A crops when fertilizer is needed for both A and B crops at the same time, applications for fertilizer for A crops must be made at least 30 days in advance of the time required.

The revised order also provides for special grades of fertilizer suitable for Victory gardens by areas. Only one grade for the entire country was available last year. The grades which will be available next year are: 6–10–4 for Pacific coast states, 4–12–4 for Midwest states, and 5–10–5 for Atlantic coast and Southern states. Victory gardeners will also be able to purchase small quantities of nitrate of soda, ammonium sulphate and ammonium nitrate to supplement the mixed fertilizer, where such is needed.

Restrictions on the manufacture of "specialty" fertilizers for non-food uses are continued. Specialty fertilizers are used chiefly on such areas as lawns, golf courses and parks, and manufacturers may not use more than 50 per cent of the nitrogen and potash used in such fertilizers in the 1941–42 fertilizer year, and each manufacturer may make only one grade of a specialty fertilizer.

The provisions of the revised fertilizer order were worked out with the cooperation of State College agronomists, USDA War Boards, and the Fertilizer Industry Advisory committee.

Fertilizer Manufacturing Profits

A report by the Securities and Exchange Commission on the profits of 864 firms listed with the Commission, included returns from five fertilizer companies. They showed an investment of slightly over $100,000,000 and the net profit in 1941, after all charges, was 3.87 per cent of invested capital, on sales of 84 million dollars. This compares with a net return of 9.91 per cent for the entire 864 companies on a capital investment of 28 billion dollars.

FERTILIZER MATERIALS MARKET

NEW YORK

Import Quota on Nitrate of Soda Still Undecided. Oil Meals Permitted for Fertilizers if Available for Purchase. Potash Deliveries Proceeding on Contracts. Triple Superphosphate Allocated to Northeastern Section.

Exclusive Correspondence to "The American Fertilizer"

NEW YORK, July 16, 1943.

Inorganic Ammonia

There is no change in this situation, but up to now no definite decision has been made as to the quantity of nitrate of soda to be imported from Chile. Deliveries of sulphate of ammonia are being made regularly against contracts and definite allocations as made.

Organic Ammonia

It has been intimated that fertilizer manufacturers will have the privilege of buying up to a total of 40,000 tons of feeding oil meals, provided such material can be purchased by them. Various manufacturers will be allowed to purchase certain proportions of the quantities purchased by them over a previous given period. We understand that this action was taken especially for use of the material for the manufacture of tobacco fertilizers.

Potash

Material is being delivered against contracts on quantities previously allocated. Certain large quantities are expected to be exported within the next few months.

Fish Meal

Operations have not improved and there is no change in the previous anticipation.

Superphosphate

This material continues scarce and in many cases green material is being shipped, which means a considerable loss to the manufacturers. A definite quantity of triple superphosphate has now been allocated for shipment to the Northeastern part of the United States for the July–December period and deliveries have already been made against this allocation.

BALTIMORE

Price of Organics Too High for Fertilizer Use. Allocation of Sulphate of Ammonia and Nitrate of Soda to be Connected. Superphosphate Scarce.

Exclusive Correspondence to "The American Fertilizer"

BALTIMORE, July 13, 1943.

The spring season has now come to an end and manufacturers are figuring ahead for the coming season, at which period the Department of Agriculture is anxious to increase crops about 35 per cent. This will, of course, necessitate allocation of raw materials accordingly.

Ammoniates.—With heavy demand for organic ammoniates for feeding purposes, this material is now out of the class of fertilizer materials.

Sulphate of Ammonia.—Fertilizer manufacturers are again booking contracts under allocation, and some of them prefer to take either ammonium sulphate or liquid ammonia instead of ammonium nitrate, although the latter will probably find a ready market when manufacturers find it impossible to secure their requirements in the form of sulphate and/or ammonia liquor. It is planned that for each two tons of sulphate of ammonia manufacturers must take one ton of nitrate of soda to effect equitable distribution.

Nitrate of Soda.—It is anticipated that a fairly good volume of this material will again be available for fertilizer manufacturers for mixing purposes, especially if the program of using one ton of nitrate for every two tons of sulphate is put through.

Fish meal.—It is expected the price of this material suitable for feeding purposes will be so high as to make it almost prohibitive for fertilizer manufacturers.

Superphosphate.—The demand for sulphuric acid continues good, and as a consequence there is no accumulation of superphosphate.

As a matter of fact, it is difficult at the present time, if not impossible, to purchase at ceiling price at 64 cents per unit of A. P. A. for run-of-pile, in bulk, f.o.b. producers' works, Baltimore, due to closely sold-up position of manufacturers.

Potash.—Allocation of this material for the coming season is causing considerable concern as no substitutes are available, and if there would be an increase in production, it would be at the expense of the potash content of the mixed goods.

Bone Meal.—The market on both raw and steamed bone meal is quiet, with practically no business passing. The nominal market is around $50.00 per ton.

Bags.—The situation is unchanged, and new burlap bags are still not available for shipment of manufactured fertilizer.

CHARLESTON

Chemical Nitrogen Prospects Better Than Last Year. Ammonium Nitrate and Nitrogen Solutions Urged. Some Sales of Nitrogens Reported.

Exclusive Correspondence to "The American Fertilizer"

CHARLESTON, July 12, 1943.

The picture as regards supplies of mineral nitrogen is very much better than last season, as the total visible supply is estimated by WPB in terms of nitrogen as 520,000 tons. This does not include any estimate as to the quantity of Chilean nitrate of soda needed.

Sulphate of Ammonia.—Buyers are urged to use ammonium nitrate and nitrogen solutions as far as possible in place of ammonium sulphate.

Dried Blood.—There is no change in this situation. Price is still $5.38 per unit of ammonia ($6.54 per unit N) f.o.b. Chicago. Practically the entire output is going to feed.

Nitrate of Soda.—Market is steady on this material at the last price.

Nitrogenous.—One seller has recently been allocating a limited amount to buyers of the last 2 years at $3.25 per unit of ammonia, ($3.95 per unit N) f.o.b. Chemical; $3.50 ($4.25½ per unit N), Norfolk.

Oil Meals.—Cottonseed meal, 8 per cent grade, is priced nominally at $38.50, Atlanta. Soybean meal is quoted at $45.20, Atlanta. Practically no cottonseed meal or peanut meal is available except for small sales locally.

CHICAGO

Demand Steady but Offerings Light; Steamed Bone Wanted for Fertilizer but Unobtainable. New Ceilings on Tankage and Blood.

Exclusive Correspondence to "The American Fertilizer"

CHICAGO, July 15, 1943.

Only extremely light trading occurred in this market, prices remaining at ceiling. Demand is continuous, but sellers are backward in offerings. No change in official instructions have been received up to this time.

Numerous calls for fertilizer steamed bone, especially for fall shipments, are in the market, but this article is unobtainable at present.

Ceiling prices of dry rendered tankage have been raised to $1.25 per unit of protein, and of blood to $5.53 per unit of ammonia ($6.72 per unit N), but these articles are no longer considered as fertilizer materials.

TENNESSEE PHOSPHATE

Dry Spell Hurts Crops. Mining and Shipping of Rock Proceeding to Limit of Facilities Available. Personnel Changes Announced.

Exclusive Correspondence to "The American Fertilizer"

COLUMBIA, TENN., July 12, 1943.

For more than a month, with exception of one widely extended heavy rain and scattered thundershowers, this entire section has experienced the worst June–July drought since the terrible dry spell of 1930.

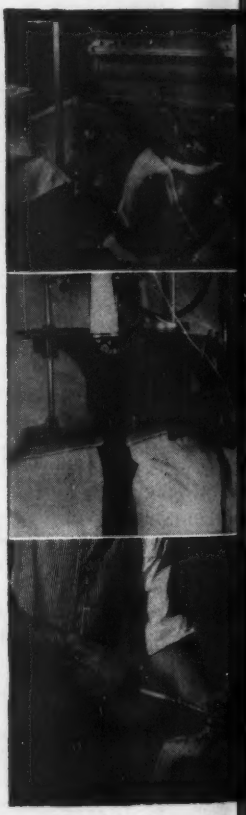
(Continued on page 20)

Select the St. Regis Bag Packing System that fits your production requirements

St. Regis Valve Pack System—St. Regis Automatic Packing Machines are of three types—Belt, Screw, and Impeller. They preweigh the product and force it into self-closing valve type Multiwall Paper Bags. This operation offers maximum production with a minimum amount of labor. We also manufacture Gravity Type Packers for filling Valve Bags.

St. Regis Sewn Pack System—This system is for open-mouth bag users. Automatic sewing machines apply an efficient and economical closure. A bound-over tape and a filter cord are applied by this equipment and sewn through all plies of the open-mouth bag.

St. Regis Wire Tied Pack System—Where the number of units does not warrant the installation of automatic equipment, the St. Regis Wire Tie offers an economical method of closing open-mouth bags. A hand-twisting tool constitutes the entire equipment for effecting the securely tied closure around the mouth of the bag.



A capable St. Regis engineer will be glad to suggest the best method of adapting or changing over your present equipment.

Many fine Victory Gardens have had to be plowed up as utter failures and corn and tobacco in many fields, planted either too early or too late, are very poor makeshifts or have had to be planted over.

All small grain has been threshed and while there were some of the usual fine yields, the average crop of wheat, oats, barley and rye was poor.

Tomatoes are poor, while even for the small crop anticipated, the canners are unable to enlist promise of enough labor to handle.

Mining and preparation of phosphate rock is proceeding with great rapidity, but bagging and loading of ground rock has been much hampered by breakdowns, incipient strikes and threats of strikes, with much reduced personnel and some deficiency of car supply. Most distributors of that product are further behind than ever in filling the flood of orders. The small number of cancellations and postponements usual in June and July are not in the least objectionable when they come, as it gives chances to supply others who are ready to take shipment.

Two important changes in the personnel of the two largest operators in the Tennessee phosphate field have occurred recently. J. V. S. Norton of the International Minerals & Chemical Corporation has resigned his post of Local Manager, expecting to go into the Civil Aeronautic Patrol. It is reported he intends later to engage in the phosphate mining field independently. William Stringham, local superintendent of the V. C. Co., mining branch, has resigned and will be located at Johnson City, Tenn., with the Tennessee Zinc Co., reported to have purchased 13,000 acres of zinc lands and soon to erect smelter and mills.

No successor has yet been officially announced for either. Both of these gentlemen are highly thought of both in the trade and by the local communities in which they were active figures.

Shipments into all consuming channels are proceeding actively, subject to the interruptions above noted. There are very large inquiries out from makers of ordinary superphosphate, the three large electric furnace plants, and manufacturers of mineral mixtures for livestock.

Many inquiries for defluorinated phosphate are being received from feed manufacturers and large livestock interests, due to inability to get bone products even at prohibitive prices.

Nitrogen on Raspberries Shows Notable Profits

The value of nitrogen fertilizers in the growing of raspberries has been strikingly demonstrated in experiments carried out by the New York Agricultural Experiment Station in 1942. Six different nitrogen fertilizers were used, the best results being obtained with nitrate of soda, sulphate of ammonia, and Uramon. The highest yield was at the rate of 4700 quarts per acre, an increase of 1500 quarts over the no-fertilizer plot. At the rate of 12 cents per quart, this means an increase of $180 per acre for an expenditure of only $4 to $6 for fertilizer. The experiments, which were reported in the July issue of *Farm Research*, Geneva, N. Y., are being continued.

CLASSIFIED ADVERTISEMENT

WANTED

WANTED—Fertilizer Grinder, twenty tons per hour capacity. Address "610" care THE AMERICAN FERTILIZER, Philadelphia.

WANTED—Assistant Superintendent for dry mixing fertilizer factory at Charleston, South Carolina. State age, married or single, experience, salary expected. Address "615" care THE AMERICAN FERTILIZER, Philadelphia.

May Sulphate of Ammonia

According to the figures of the U. S. Bureau of Mines, production of by-product sulphate of ammonia and ammonia liquor continued at established levels. The output of sulphate was 64,402 tons, an increase of about 1 per cent over April, and of ammonia liquor 2927 tons, an increase of 2 per cent over April. Shipments of sulphate increased slightly with the result that stocks on hand at the end of the month had been reduced to 20,198 tons. The figures for production, shipments and stocks on hand are as follows:

	SULPHATE OF AMMONIA	AMMONIA LIQUOR
Production	*Tons*	*Tons NH^3*
May, 1943	64,402	2,927
April, 1943	63,840	2,872
May, 1942	66,873	2,815
January–May, 1943	317,282	14,159
January–May, 1942	319,995	14,023
Shipments		
May, 1943	67,138	2,987
April, 1943	63,351	3,066
May, 1942	61,488	2,539
Stocks on Hand		
May 31, 1943	20,198	827
April 30, 1943	23,585	728
May 31, 1942	13,878	782
April 30, 1942	8,792	662

July Cotton Report

The acreage of cotton in cultivation in the United States on July 1, 1943 is estimated by the Crop Reporting Board at 21,995,000 acres which is 1,307,000 acres or 5.6 per cent less than last year, and 7,513,000 acres or 25.5 per cent less than the 10-year (1932-41) average. Assuming 10-year average abandonment an acreage of 21,576,000 acres is indicated for harvest in 1943. Such an acreage would be smaller than that for any year since 1895.

Reduction in acreage from last year is indicated for all States excepting Mississippi where there was an increase of approximately 2 per cent, and in North Carolina where 1943 acreage is slightly above last year.

Texas shows a reduction of 380,000 acres, Oklahoma 292,000 Georgia 155,000, Alabama 152,000, and Arkansas 101,000. A large part of the acreage decrease in Oklahoma and Arkansas was due to losses from floods during late May and early June. Increases in acreage above last year were confined chiefly to counties in the Mississippi River Delta, where most of the longer staples of upland cotton are produced.

Total acreage planted in the three Western States (New Mexico, Arizona, and California) is 165,000 below that planted in 1942. In Arizona and California considerable difficulty was experienced in harvesting the crop last year. Most of the reduction in New Mexico occurred in the dry land area where rainfall has been deficient throughout the planting season.

The acreage planted to American Egyptian cotton is estimated at 146,400, compared with 192,900 acres planted in 1942. Sea Island cotton acreage, at 3100, is slightly less than half the 6700 acres planted a year ago.

Farm Product Prices Continue to Advance

Prices received by farmers in mid-May, averaged 187 per cent of their 1910–1914 level, the highest point reached since 1920. The price average was 23 per cent higher than a year ago.

The price trend has been about the same during this war to date as it was in the corresponding period of World War 1. It seems doubtful, however, if the advance will continue until the price average reaches the earlier peak of 244, recorded in May 1920. The rate of increase has been slowing up since last December. Prices of a growing list of farm products are at their ceiling or are approaching the maximum levels believed to be consistent with the ceilings fixed on products processed from them. A small number of farm products, however, could still advance onsiderably below permitted maxima. However, if the present system of price controls operates effectively, any further rise in prices is likely to prove moderate in extent and orderly in nature.

Livestock and livestock products and potatoes were selling in May considerably above parity. Cotton was somewhat above the parity level while grains remained below parity.

NITROGEN SUPPLIES AND THEIR ALLOCATION

(Continued from page 9)

buyer who is advanced in his takings will be in a position to utilize them.

In the case of ammonium sulphate, the procedure is slightly different. Allocations of this material will be approved only in proportion to the manufacturer's acceptance of solutions or grained ammonium nitrate. At the same time the supplier's supplemental ammonium sulphate list will be smaller since the amount offered will consist only of abandoned shipments. The remaining ammonium sulphate production will be reserved for allocation as may later prove advisable.

Cal-Nitro, uramon, and cyanamid for direct application, and nitrate of soda are not included in the present plan. These materials are primarily for direct application and are being reserved for distribution at a later date.

We will also ask for your inventory as of July 1, divided into

1. Nitrogen for mixing,
2. Nitrogen for top dressing,
3. Nitrogen in the form of bagged nitrate of soda, and
4. Nitrogen on hand allocated for airport use.

The Nitrogen Unit is well aware of the difficulties for the fertilizer industry inherent in this program. The industry will have to adjust itself to a steady and high rate of production. Fertilizer will have to be made, distributed, and even used, where possible, at periods of the year when the demand is traditionally at low ebb.

Nevertheless, in so far as our powers permit, the shock will be cushioned. We have some storage capacity, particularly for the four top-dressing materials last mentioned, which will be utilized to the full. But those commodities, too, will have to be moved within a reasonable time. The over-all effect will be an elimination of the low-production periods of the year and an intensified effort to move the largest possible amount of agricultural nitrogen to use on the land steadily throughout the year. In so far as the industry and the men in it succeed in this purpose, more food will be grown. Food is a munition of war and essential for the healing processes of peace.

As I stated before, this program is posing problems to the fertilizer industry that we would have preferred to avoid. But as one of our good correspondents wrote us a few days ago:

"As we view it, there's nothing we can do but try it out. We have placed our order. We Presbyterians are said to believe that what is to be will be. In the absence of nitrate of soda, Mr. Farmer, like the rest of us, will have to take and use what he can get, like getting married for better or for worse."

Seriously though, my friends, we of the Nitrogen Unit of the War Production Board are turning our every effort toward making this program a success; and we feel sure that you will exert yourselves to overcome such complications as occur in our battle on the home front.

POTASH AND SUPERPHOSPHATE SUPPLIES AND PROBLEMS

(Continued from page 7)

will be provided during the discount period and that 10 per cent can be delivered in the spot season. In other words, if you divide the total K_2O allocated to you during Period Two by 90 and multiply that by 100, you will obtain a figure representing the total quantity that you have reason to expect during the 1943–44 season.

How do allocations for 1943–44 compare to previous years? The following figures answer that question:

(Continued on page 26)

Potash deliveries in previous years and 1934-44 allocations for Period Two. The figures include potash for agricultureal use only in the United States and posessions.

	1943–44	1942–43	1941–42	1940–41
	(Tons of each material)			
60% muriate	582,673	691,571	615,074	516,053
50% muriate	80,284	66,324	58,550	155,584
25–30% muriate	168,800	173,055	133,062	20,442
Sulphate	69,658	65,961	61,446	50,416
S. P. M.[1]	45,250	29,961	28,308	.....

[1] Sulphate of potash-magnesia.

The above table includes only the quantities delivered during the ten-month period, June through March.

I should like to explain briefly the method of arriving at allocations for export. No doubt you have all heard of the Combined Food and Combined Raw Materials Boards. Some months ago a committee was formulated responsible to both boards whose duty it is to consider over-all distribution of fertilizer materials between the Allied Nations. That committee, like the boards to which it is responsible, is composed of representatives of the United Kingdom, Canada, and the United States. Each country's requirements of the different raw materials are presented by its respective representatives. Recommendations of the boards are submitted to the respective governments for concurrrence and when concurred in they set a pattern for the War Production Board in the United States and the corresponding agencies of other countries for the making of allocations for imports and exports. It was recommended that 60,000 tons of high-grade muriate be set aside for export to the United Kingdom, but that any part of this 60,000 tons which can be obtained from other sources, such as Russia and Spain, should be deducted and reallocated to the fertilizer industry. In view of this provision, additional quantities of potash may be allocated during Period Two. In any event, the amounts are expected to be comparatively small. The Canadian allocation was treated in exactly the same manner as that for the United Kingdom.

The superphosphate situation may be summarized as follows:

1. The War Food Administration wants all it can get.
2. There is a very good possibility that more than 6,600,000 tons will be produced in 1943–44.
3. It is evident that a program to supply additional sulphuric acid will be required to produce even 6,600,000 tons.
4. Only small quantities of concentrated superphosphate will be available on the East Coast.

The potash situation may be summarized as follows:

1. Domestic plants are operating at capacity and there is no increased production in sight.
2. The outlook for imports during 1943–44 is not promising.
3. Although we shall produce over 700,000 tons of K_2O, the fertilizer industry will have less high-grade muriate than last year. There is as much or more of all other salts.
4. It appears that there will be about as much K_2O available for agriculture as in 1941–42.

PROBLEMS IN FORMULATING FERTILIZERS

(Continued from page 12)

the use of a large tonnage of ammonium nitrate. Although this material, as originally produced for munitions use, cannot be used easily or conveniently in humid climates, either for mixing or for top-dressing, the recently produced improved forms, as evidenced by the various samples on display at this meeting, give promise of enabling you to meet the present emergency at reasonable cost for materials and manipulating, and with satisfaction to your customers.

The large tonnage of ammonium nitrate solutions and Cal-Nitro (ammonium nitrate-limestone) that has been used in mixing during the past ten years has proved that ammonium nitrate can be used safely and satisfactorily when it is put in a usable condition. The conditioning of the ammonium nitrate can be done more economically in the factories where it is made than in the factories or on the farms where it is to be used. Ammonium nitrate particles of 10 to 60 mesh in size, dusted with an inert non-reactive material, and shipped in asphalted paper bags should arrive at destination points sufficiently dry and friable to handle easily to the mixing machines.

If the usual quantities of neutralizing ammonia, cyanamid, hydrated or burnt lime, or cement flue dust are used, no hygroscopic effects in the complete fertilizer should result when one, two, or even three units of nitrogen are derived from ammonium nitrate.

BUYERS' GUIDE • A CLASSIFIED INDEX TO ALL THE ADVERTISERS IN "THE AMERICAN FERTILIZER"

This list contains representative concerns in the Commercial Fertilizer Industry, including fertilizer manufacturers, machinery and equipment manufacturers, dealers in and manufacturers of commercial fertilizer materials and supplies, brokers, chemists, etc.
For Alphabetical List of Advertisers, see page 33.

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Chemical Construction Corp., New York City.

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Chemical Construction Corp., New York City.

ACIDULATING UNITS
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Bemis Bro. Bag Co., St. Louis, Mo.
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BORAX AND BORIC ACID
American Potash and Chem. Corp., New York City.
Pacific Coast Borax Co., New York City.

BROKERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Dickerson Co., The, Philadelphia, Pa.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Keim, Samuel L., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

BUCKETS—Elevator
Link-Belt Company, Philadelphia, Chicago
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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BUYERS' GUIDE

For an Alphabetical List of all the Advertisers, see page 33

BUCKETS—For Hoists, Cranes, etc., Clam Shell, Orange Peel, Drag Line, Special; Electrically Operated and Multi Power
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.

BURNERS—Sulphur
Chemical Construction Corp., New York City.

BURNERS—Oil
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.

CABLEWAYS
Hayward Company, The, New York City.

CARBONATE OF AMMONIA
American Agricultural Chemical Co., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.

CARS—For Moving Materials
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CARTS—Fertilizer, Standard and Roller Bearing
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

CASTINGS—Acid Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.

CASTINGS—Iron and Steel
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CEMENT—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

CHAIN DRIVES—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAINS AND SPROCKETS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAMBERS—Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

CHEMICAL APPARATUS
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

CHEMICALS
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Huber & Company, New York City.

CHEMICALS—Continued
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Phosphate Mining Co., The, New York City.
Wellmann, William E., Baltimore, Md.

CHEMICAL PLANT CONSTRUCTION
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind

CHEMISTS AND ASSAYERS
Gascoyne & Co., Baltimore, Md.
Shuey & Company, Inc., Savannah, Ga.
Stillwell & Gladding, New York City.
Wiley & Company, Baltimore, Md.

CLUTCHES
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CONCENTRATORS—Sulphuric Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

CONDITIONERS AND FILLERS
American Limestone Co., Knoxville, Tenn.
Dickerson Co., The, Philadelphia, Pa.
Phosphate Mining Co., The, New York City.

CONTACT ACID PLANTS
Chemical Construction Corp., New York City.

COPPER SULPHATE
Tennessee Corporation, Atlanta, Ga.

COTTONSEED PRODUCTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

CRANES AND DERRICKS
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

CYANAMID
American Agricultural Chemical Co., New York City
American Cyanamid Co., New York City.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Jett, Joseph C., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

DENS—Superphosphate
Chemical Construction Corp., New York City.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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DISINTEGRATORS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

DRYERS—Direct Heat
Sackett & Sons Co., The A. J., Baltimore, Md.

DRIVES—Electric
Link-Belt Company, Philadelphia, Chicago.

DUMP CARS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

DUST COLLECTING SYSTEMS
Sackett & Sons Co., The A. J., Baltimore, Md.

ELECTRIC MOTORS AND APPLIANCES
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

ELEVATORS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ELEVATORS AND CONVEYORS—Portable
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

ENGINEERS—Chemical and Industrial
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ENGINES—Steam
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

EXCAVATORS AND DREDGES—Drag Line and Cableway
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Link Belt Speeder Corp., Chicago, Ill., and Cedar Rapids, Iowa.

FERTILIZER MANUFACTURERS
American Agricultural Chemical Co., New York City.
American Cyanamid Company, New York City.
Armour Fertilizer Works, Atlanta, Ga.
Farmers Fertilizer Company, Columbus, Ohio.
International Minerals and Chemical Corporation, Chicago, Ill.
Phosphate Mining Co., The, New York City.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

FISH SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

FOUNDERS AND MACHINISTS
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GARBAGE TANKAGE
Wellmann, William E., Baltimore, Md.

GEARS—Machine Moulded and Cut
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GEARS—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

GELATINE AND GLUE
American Agricultural Chemical Co., New York City.

GUANO
Baker & Bro., H. J., New York City.

HOISTS—Electric, Floor and Cage Operated, Portable
Hayward Company, The, New York City.

HOPPERS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

IMPORTERS, EXPORTERS
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Wellmann, William E., Baltimore, Md.

IRON SULPHATE
Tennessee Corporation, Atlanta, Ga.

INSECTICIDES
American Agricultural Chemical Co., New York City.

LACING—Belt
Sackett & Sons Co., The A. J., Baltimore, Md.

LIMESTONE
American Agricultural Chemical Co., New York City.
American Limestone Co., Knoxville, Tenn.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

LOADERS—Car and Wagon, for Fertilizers
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Acid Making
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Duriron Co., Inc., The, Dayton, Ohio.
Fairlie, Andrew M., Atlanta, Ga.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Coal and Ash Handling
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Elevating and Conveying
Atlanta Utility Works, East Point, Ga.
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Grinding and Pulverizing
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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MACHINERY—Power Transmission
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Pumping
Atlanta Utility Works, East Point, Ga.
Duriron Co., Inc., The, Dayton, Ohio.

MACHINERY—Tankage and Fish Scrap
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MAGNETS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MANGANESE SULPHATE
McIver & Son, Alex. M., Charleston, S. C.
Tennessee Corporation, Atlanta, Ga.

MIXERS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

NITRATE OF SODA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
Chilean Nitrate Sales Corp., New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

NITRATE OVENS AND APPARATUS
Chemical Construction Corp., New York City.

NITROGEN SOLUTIONS
Barrett Division, The, Allied Chemical & Dye Corp., New York City.

NITROGENOUS ORGANIC MATERIAL
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
DuPont de Nemours & Co., Wilmington, Del.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Smith-Rowland Co., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

NOZZLES—Spray
Monarch Mfg. Works, Philadelphia, Pa.

PACKING—For Acid Towers
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

PANS AND POTS
Stedman's Foundry and Mach. Works, Aurora, Ind.

PHOSPHATE MINING PLANTS
Chemical Construction Corp., New York City.

PHOSPHATE ROCK
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Phosphate Mining Co., The, New York City.
Ruhm, H. D., Mount Pleasant, Tenn.
Schmaltz, Jos. H., Chicago, Ill.
Southern Phosphate Corp., Baltimore, Md.
Virginia-Carolina Chemical Corp. (Mining Dept.), Richmond, Va.
Wellmann, William E., Baltimore, Md.

PIPE—Acid Resisting
Duriron Co., Inc., The, Dayton, Ohio.

PIPES—Chemical Stoneware
Chemical Construction Corp., New York City.

PIPES—Wooden
Stedman's Foundry and Mach. Works, Aurora, Ind.

PLANT CONSTRUCTION—Fertilizer and Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

POTASH SALTS—Dealers and Brokers
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

POTASH SALTS—Manufacturers
American Potash and Chem. Corp., New York City.
Potash Co. of America, New York City.
International Minerals & Chemical Corp., Chicago, Ill.
United States Potash Co., New York City.

PULLEYS AND HANGERS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

PUMPS—Acid-Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

PYRITES—Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., New York City.
Wellmann, William E., Baltimore, Md.

QUARTZ
Charlotte Chem. Laboratories, Inc., Charlotte, N. C

RINGS—Sulphuric Acid Tower
Chemical Construction Corp., New York City.

ROUGH AMMONIATES
Bradley & Baker, New York City.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

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SCALES—Including Automatic Bagging
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SCRAPERS—Drag
Hayward Company, The, New York City.

SCREENS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SEPARATORS—Air
Sackett & Sons Co., The A. J., Baltimore, Md.

SEPARATORS—Including Vibrating
Sackett & Sons Co., The A. J., Baltimore, Md.

SEPARATORS—Magnetic
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SHAFTING
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SHOVELS—Power
Link-Belt Company, Philadelphia, Chicago.
Link-Belt Speeder Corporation, Chicago, Ill., and Cedar Rapids, Iowa.
Sackett & Sons Co., The A. J., Baltimore, Md.

SPRAYS—Acid Chambers
Monarch Mfg. Works, Inc., Philadelphia, Pa.

SPROCKET WHEELS (See Chains and Sprockets)

STACKS
Sackett & Sons Co., The A. J., Baltimore, Md.

SULPHATE OF AMMONIA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Hydrocarbon Products Co., New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

SULPHUR
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Freeport Sulphur Co., New York City.
Texas Gulf Sulphur Co., New York City.

SULPHURIC ACID
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M. Charleston, S. C.

SULPHURIC ACID—Continued
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Wellmann, William E., Baltimore, Md.

SUPERPHOSPHATE
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Wellmann, William E., Baltimore, Md.

SUPERPHOSPHATE—Concentrated
Armour Fertilizer Works, Atlanta, Ga.
International Minerals & Chemical Corporation, Chicago, Ill
Phosphate Mining Co., The, New York City.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

SYPHONS—For Acid
Monarch Mfg. Works, Inc., Philadelphia, Pa.

TALLOW AND GREASE
American Agricultural Chemical Co., New York City.

TANKAGE
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Smith-Rowland, Norfolk, Va.
Wellmann, William E., Baltimore, Md.

TANKAGE—Garbage
Huber & Company, New York City.

TANKS
Sackett & Sons, Co., The A. J., Baltimore, Md.

TILE—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

TOWERS—Acid and Absorption
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

UNLOADERS—Car and Boat
Hayward Company, The, New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

UREA
DuPont de Nemours & Co., E. I., Wilmington, Del.

UREA-AMMONIA LIQUOR
DuPont de Nemours & Co., E. I., Wilmington, Del.

VALVES—Acid-Resisting
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

WHEELBARROW (See Carts)

ZINC SULPHATE
Tennessee Corporation, Atlanta, Ga.

ALPHABETICAL LIST OF ADVERTISERS

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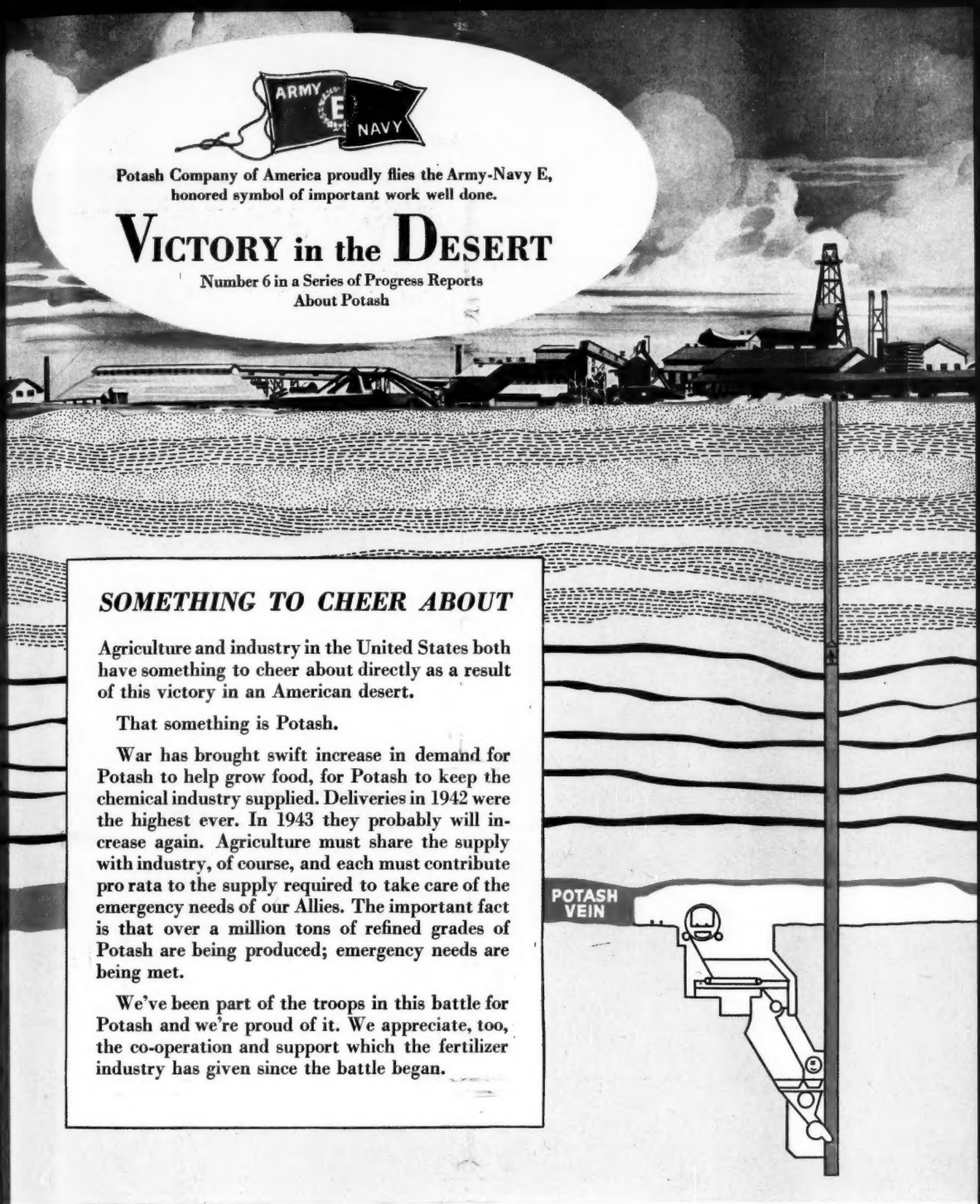


Potash Company of America proudly flies the Army-Navy E, honored symbol of important work well done.

VICTORY in the DESERT

Number 6 in a Series of Progress Reports About Potash

SOMETHING TO CHEER ABOUT

Agriculture and industry in the United States both have something to cheer about directly as a result of this victory in an American desert.

That something is Potash.

War has brought swift increase in demand for Potash to help grow food, for Potash to keep the chemical industry supplied. Deliveries in 1942 were the highest ever. In 1943 they probably will increase again. Agriculture must share the supply with industry, of course, and each must contribute pro rata to the supply required to take care of the emergency needs of our Allies. The important fact is that over a million tons of refined grades of Potash are being produced; emergency needs are being met.

We've been part of the troops in this battle for Potash and we're proud of it. We appreciate, too, the co-operation and support which the fertilizer industry has given since the battle began.

PCA RED MURIATE

POTASH COMPANY OF AMERICA

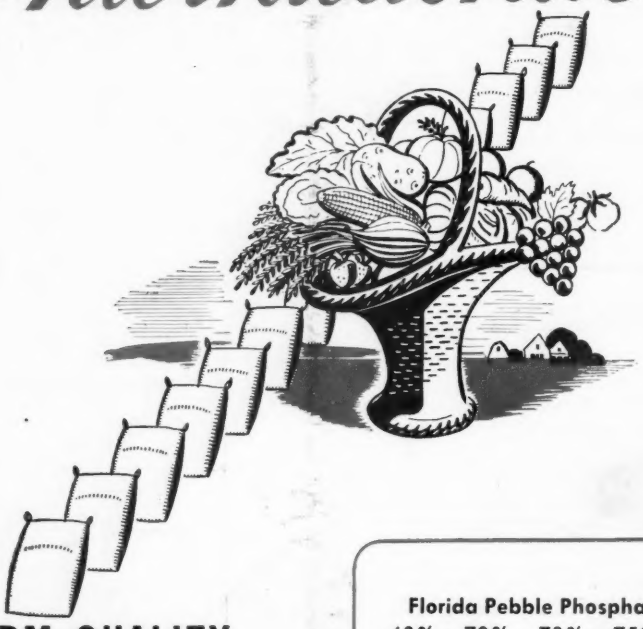
CARLSBAD, NEW MEXICO

GENERAL SALES OFFICE...50 Broadway, New York, N. Y. • SOUTHERN SALES OFFICE...Mortgage Guarantee Building, Atlanta, Ga.

CROP PRODUCING FERTILIZER MATERIALS

by

International



UNIFORM QUALITY

EXCELLENT MECHANICAL CONDITION

GOOD SERVICE

INTERNATIONAL PRODUCTS

Florida Pebble Phosphate Rock
68%—70%—72%—75%—77%

Tennessee Phosphate Rock
66%—68%—72%

Superphosphate
Multiple Superphosphate

Domestic Potash Salts

All Standard Grades of Potash
Including SUL-PO-MAG

(Sulphate of Potash-Magnesia)

Complete Fertilizers

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

General Offices: 20 North Wacker Drive, Chicago
Mining and Manufacturing

PHOSPHATE • POTASH • FERTILIZER • CHEMICALS